Comprehensive Nutrient Management Plan
For
Walnutdale Farms, LLC.
March, 2008

Overview

Walnutdale Farms is an existing dairy operation located at 4309 14th st. in Section 13 of Dorr Township in Allegan County. This is an incorporated family run farm owned by (b) (6) (b) (6) This farming operation is home to 1,100 cows weighing an average of 1,400 pounds, totaling 1,540 animal units. Animal units are based on one animal unit equaling 1,000 pounds of live weight. Calves born at the dairy are sent to satellite locations owned by Walnutdale, these facilities fall under a separate CNMP and land base.

Walnutdale is considering expansion of up to 230 head in the future. This CNMP will be updated and storages correctly designed and located prior to population of animals. This expansion does not have a time table at this time.

This CNMP will estimate crop acreage required to utilize the nutrients found in the manure produced at the dairy facility. This plan will also identify management, vegetative, and structural practices used to minimize the potential for adverse impacts on water quality and public health. This CNMP will be updated annually, unless a change of 10% or greater occurs in livestock numbers or notable changes in the land base available for application. If such a change occurs, the plan will be updated to include these new numbers and acreage.

Sampling and Calibration

Walnutdale produces crops on 1,857.1 tillable acres, 1,794 of those acres are available for manure application based on soil test phosphorus levels (those having a value of less than 300lbs/acre using the Bray P1 test). Soil samples are based on crop history, soil types and management practices. Sampling zones are typically under 20 acres per sample (unless the soil type is the same and the field has been managed the same for 10 years) or have been GPS sampled in 2.5 acres grids. Soil tests are taken every third year and are used to make manure and fertilizer recommendations for the desired crops. Crops are grown include corn, wheat, and alfalfa.

Walnutdale has an agreement with County Line Farms (b) (6) Farm) where Walnutdale is purchasing feed produced on County Line's acreage and in return the land is available for Walnutdale to apply manure on. Currently 873 acres are available based on soil test results. Maps and information on these fields will be included in appendix five.

Manure samples are taken each spring during application to ensure that the sample represents the materials being applied.

Manure application equipment is calibrated by weighing the equipment full and empty and determining the amount of manure being applied, then performing an application to determine the area of application.

Resource Concerns
Water quality concerns addressed in this CNMP are focused on ground and/or surface waters in the area surrounding the dairy facility and the fields managed by Walnutdale. The largest risk of offsite nutrient movement occurs during the land application of nutrients near surface waters. This plan, in association with proper management and training, will minimize the risk of nutrients entering surface or groundwater.

Animal Outputs

Animal Inventory
Table 1. ***Animal Inventory***

Animal ID	*Animal Type And Production Phase*	*Animal Weight (Lb)*	*Number Of Animals*
Group 1	Milk cow (dairy)	1,400	200
Group 2	Milk cow (dairy)	1,400	200
Group 5 Steam up	Dry cow (dairy)	1,450	75
Group 8	Milk cow (dairy)	1,400	160
Group 6&7	Milk cow (dairy)	1,400	400
Fresh Cows	Milk cow (dairy)	1,375	10
Group 15	Milk cow (dairy)	1,400	45
Hospital Cows	Milk cow (dairy)	1,300	10

Cow groups as identified above are labeled on the site map. Calves born on the dairy facility are moved to offsite operations not part of this CNMP. The dry cows from this dairy are moved offsite when they go off lactation, they are brought back to the dairy facility just before calving (the steam up group).

The table below shows cow groups, where the manure will be stored and estimated annual production.

Table 2. ***Manure Production and storage facilities.***

Animal ID	*Animal Type And Production Phase*	*Animal Weight (Lb)*	*Number Of Animals*	*Animals Present From*	*Animals Present Through*	*Manure Collected (%)*	*Extra Water (Gal/Animal/ Day)*	*Bedding (Lb/ Animal/ Day)*	*Notes*	*Where Will Manure Be Stored?*	*Estimated Manure Production*	*Production Units*
Group 1	Milk cow (dairy)	1,400	200	Jan Early	Dec Late	100		9	sand	Pit 1	1,298,000	Gal/Year
Group 2	Milk cow (dairy)	1,400	200	Jan Early	Dec Late	100		9	sand	Pit 2	1,298,000	Gal/Year
Group 5 Steam up	Dry cow (dairy)	1,450	75	Jan Early	Dec Late	75		9	sand	Pit 3	289,000	Gal/Year
Lot runoff	Milk cow (dairy)	1,400	1,005	Jan Early	Dec Late	1	0.2			Pit 4	138,000	Gal/Year
Milk house wash	Milk cow (dairy)	1,400	1,005	Jan Early	Dec Late	1	4.1			Slurry Store #5	1,570,000	Gal/Year
Group 8	Milk cow (dairy)	1,400	160	Jan Early	Dec Late	100		9	sand	Pit 6	1,038,000	Gal/Year
Group 6&7	Milk cow (dairy)	1,400	400	Jan Early	Dec Late	100	0.3	9	sand	Pit 7	2,640,000	Gal/Year
Storage										Pit 8		Gal/Year
Catch Basin										Catch Basin	2,750,000	Gal/Year
Group 5 Dry	Dry cow (dairy)	1,400	75	Jan Early	Dec Late	25		5	shavings	Group 5 Dry	402	Ton/Year
Fresh Cows	Milk cow (dairy)	1,375	10	Jan Early	Dec Late	100		10	straw	Fresh Cows Dry	246	Ton/Year
Group 15	Milk cow (dairy)	1,400	45	Jan Early	Dec Late	100		9	sand	Pit 4	292,000	Gal/Year
Hospital Cows	Milk cow (dairy)	1,300	10	Jan Early	Dec Late	100		5	shavings	Hospital Cows	222	Ton/Year
									Manure volume		**8,563,000**	**Gal/Year**
									Catch Basin		**2,750,000**	**Gal/Year**
									Pen Pack		**870**	**Ton/Year**

Nutrient Production:

The annual phosphorus production for Walnutdale has been determined by using mass balance analysis. This method of determining phosphorus production considers the feed ration (amount of feed, and P concentration in that feed) the amount of phosphorus removed in milk production, and the amount of phosphorus removed in calves. Based on feed inputs and milk production at Walnutdale Dairy, the **estimated P2O5 produced at this location is 124,796 pounds per year** (mass balance analysis can be found in appendix 4). The crop removal rate per acre on land that Walnutdale manages for crop production is 63.6 lbs/acre; using this rate of removal a sustainable operation would need 1,962 acres. Walnutdale Dairy currently manages 1,857 acres and has relationships with area growers who utilize manure produced at the dairy; based on the additional acreage

from area growers, this is a sustainable operation. Offsite manure applied in 2006 was nearly one million gallons and the offsite manure applications for 2007 were over three million gallons. Fertilizer prices and other factors have resulted in an increased interest in receiving manure applications from the dairy for other area farmers over the last few years. Manure transferred offsite is recorded and the appropriate data is collected and retained by Walnutdale farms.

Maps of Production Area
Maps showing the dairy facility can be found in Appendix 1.

Production Area Conservation Practices
Cattle are under cover with the exception of the alleyways between the barns and the milking parlor. The runoff from alleys is collected in the manure pits or in the catch basin. The collection basin was designed by NTH Consultants and installed in 2006 to collect the lot runoff from the silage pad and areas that manure may come into contact with. The liquid is collected and land applied with an irrigation gun according to nutrient load and crop yield goals.

Roof Gutters are used to divert clean water from coming into contact with walkways that have manure present.

Manure Collection and Storage
Collection
Liquid manure from free stall barns is scraped daily with a uniloader directly into the storage facilities. Pits are emptied with a transfer pump and moved to the manure to the storage pit (pit #8) or loaded into a tanker or manure spreader and then land applied at agronomic rates. Liquid manure is applied using one of the following:

- Houle Spreader (injected or surface apply) 7,300 gallons
- Knight Slinger (liquid) 2,900 gallons
- Semi Tanker 7,500 gallons
- Balzer Spreader 5,500 gallons
- Irrigation (Pull)

Dry manure is pen packed for one month and land applied with one of the following:

- Knight Slinger (dry) 16 tons
- Meyer Spreader 15 tons
- John Deere Box Spreader (hydro-push) 2 tons

All Manure storage structures are outdoors and without covering. Pits 1-3 and 6-8 receive manure with sand bedding. Pits 4&5 do not collect any bedding.

Manure Storage Structures and Facilities
Pit #1: Pit #1 is a reinforced concrete pit measuring 55’ x 35’ x 6’ with a 36’ long 6:1 ramp. The usable volume of this pit is 81,911 gallons, allowing one foot of freeboard and six inches for a 25 year, 24 hour storm event. Storage time for this structure is 21.7 days. Manure from this pit is produced by the Group 1 Cows.

Pit #2: Pit #2 is a reinforced concrete pit measuring 55’ x 35’ x 6’ with a 36’ long 6:1 ramp. The usable volume of this pit is 81,911 gallons, allowing one foot for freeboard and six inches for a 25 year, 24 hour storm event. Storage time for this structure is 21.7 days. Manure from this pit is produced by the Group 2 Cows.

Pit #3: Pit #3 is a reinforced concrete pit measuring 40’ x 25’ x 6’ with a 36’ long 6:1 ramp. The usable volume of this pit is 45,535 gallons, allowing for one foot of freeboard and six inches for a 25 year, 24 hour storm event. Storage time for this pit equals 67.9 days. Manure from this pit is produced by the Group 5 cows. The Group 5 cows spend half of their time on sand bedding and half on sawdust only 50% of the estimated manure production is used to determine the storage time for this structure. The remaining manure produced by the Group 5 cows is pen packed and handled as dry manure and land applied monthly.

Pit #4: Pit #4 is a reinforced concrete structure measuring 60’ x 20’ x 8’. The usable volume of this pit is 50,490 gallons, allowing for one foot of freeboard and one foot for a 25 year, 24 hour storm event. Storage time for this pit is estimated at 11.7 days. Material in this pit is from the milk house and parlor wastewater, as well as lot runoff from the barnyard (60’ x 92’) and the east section of the Group 5 barn (25’ x 92’).

Slurry Store (Pit #5): The slurry store is a glass lined prefabricated slurry store measuring 25’ high and 80’ across. The usable volume of this pit is 1,333,338 gallons, allowing for one foot of freeboard and six inches for a 25 year, 24 hour storm event. Storage time for this structure is 297 days. Manure in this storage structure is pumped from Pit #4.

Pit #6: Pit #6 is a reinforced concrete pit measuring 42’ x 34’ x 6’ with a 36’ long 6:1 ramp. The usable volume of this pit is 91,780 gallons allowing for 1.5 feet of freeboard. Storage time for this structure is 30.4 days. Manure from Group 8 is collected in this structure.

Pit #7: Pit #7 is a reinforced concrete pit measuring 44’ x 44’ x 6’ with a 36’ long 6:1 ramp. The usable volume of this pit is 66,482 gallons, allowing for 1.75’ freeboard and six inches for a 25 year, 24 hour storm event. Storage time for this structure is 10 days. Manure from this pit is produced by Groups 6&7.

Pit #8: Pit #8 is a rubber lined storage structure measuring 310’ x 250’ with an access ramp. The usable volume of this pit is calculated at 3.9 million gallons, allowing for one foot freeboard and six inches for the 25 year, 24 hour storm event. Storage time for this structure is estimated at 180 days. NTH Consultants, Ltd. calculated the total usable volume for this structure when it was designed (See appendix 9). This pit was designed as the storage structures for manure from the other pits during winter or while the crops are in the field. The storage time for this structure was based on the total production of the farm. NTH Consultants provided a storage evaluation which is located in appendix 9.

Catch Basin: A catch basin designed by NTH Consultants was installed in 2006 for the purpose of collecting contaminated lot run-off and silage leachate. This storage structure has an estimated capacity of three million gallons. The liquid collected in this storage structure is applied using an irrigation gun. As built documentation for this manure storage structure can be obtained from [redacted] upon request.

Markers have been installed in all the pits. These markers indicate the level of freeboard left in the structures.

All pit calculations can be found in appendix 9.

Fresh Cow Barn: Dry manure produced in the fresh cow barn, by the steam up group, and from half of the Group 5 cows. This manure is pen packed for one month, then loaded out and land applied according to field nutrient needs.

Farm Management

Feed Storage: Silage is stored on the silage pad on the east side of the farm on a covered pile (see site map and overview). This pile remains covered year round. All leachate from the silage pile collected in the catch basin. Commodities are stored in the commodity shed that is located to the west of the silage pad.
Haylage is bagged and stored on the new asphalt pad on the south end of the farm. Work is being done with an engineer to collect runoff from the haylage pad and allowing for the diversion of clean water and full collection of contamintated water.

Feed Refusal:
Feed Refusal is estimated at a rate of 3% per day. All refused feed is fed to heifers at the offsite locations.

*The feed refusal rate is an estimate from the producer.

Veterinary Wastes:
Needles and other veterinary wastes are stored in a “sharps” container (a designated, hard, plastic container) and hauled to a landfill by a licensed waste hauler.

Mortality Management
Animal Mortalities are picked up by a local rendering company.

Milk house and Parlor Wastewater: Wastewater from both the milk house and parlor are stored in Pit #4. From there the contents of the pit are piped in to the slurry store (storage #5). Estimates for annual wastewater production are found in table 2, detailing the manure production for the farm (found on page 3).

Plate Cooler Water: All water from the plate coolers is recycled as drinking water for the cows and is also used to wash down the parlor.

Feedlot run-off: There are no feedlots on this farm; there are walkways between buildings that the cattle take from barn to parlor. This walkway is in front of groups 6, 7&8 and on the barns to the south of the parlor. The runoff from these areas is collected in the catch basin or in pit #4. Cattle remain under cover in all other areas.

Manure Transfer:
Liquid manure is loaded directly into land application equipment or loaded into semi tankers that transfer the manure to a liquid manure spreader at the fields. Dry manure is hauled to the field with a tractor drawn box spreader, slinger spreader or using rented equipment (a slinger box mounted on a straight truck).

Odor Management: Manure is handled with care and prevented from getting onto roadways to reduce odor issues. Manure produced at this facility is injected when possible and incorporated when tillage practices allow. Manure applications are made with care concerning neighboring residences, weekends, holidays and other high use times are avoided when possible.

Conservation Practices and Land Management

Soil Related Issues:
Included in this plan are current soil test results as well as Revised Universal Soil Loss Equation (RUSLE2) calculations and Manure Application Risk Index (MARI) evaluations for all fields. Field maps show sensitive areas with different colors signifying varying levels of sensitivity.

Fields with RUSLE2 values greater than the tolerable limit "T" for the specific soil type in will not receive manure applications without actions being taken to reduce the risk of offsite nutrient flow in the form of soil erosion. Fields with estimated rates of erosion that exceed the tolerable limit are listed below in Table 3.

Table 3. ***RUSLE2 evaluation results.***

Walnutdale Dairy 2008 Fields exceeding RUSLE2 Rates and Alternate crop plans

Field ID	Acres	Tolerable Rate		Predicted rate		Alternate crop rate	
H3	21	5	tons/yr	23	tons/yr	5	tons/yr
H4A	18	5	tons/yr	15	tons/yr	5	tons/yr
H4B	18	5	tons/yr	6.5	tons/yr	2.1	tons/yr
H4C	18	5	tons/yr	11	tons/yr	4.6	tons/yr
H4D	18	5	tons/yr	7.2	tons/yr	3.5	tons/yr
H8	14	5	tons/yr	5.9	tons/yr	3.1	tons/yr
ED21A	22	5	tons/yr	6.8	tons/yr	2.3	tons/yr
ED21B	22	5	tons/yr	9.7	tons/yr	3.2	tons/yr
K26A	30	3	tons/yr	9.9	tons/yr	2.9/.096	tons/yr
EM28A	14	3	tons/yr	9.1	tons/yr	1.6	tons/yr
EM28B	14	5	tons/yr	7.6	tons/yr	4.2	tons/yr

UB37A	23	4	tons/yr	6.3	tons/yr	4	tons/yr
UB37B	23	4	tons/yr	6.3	tons/yr	4	tons/yr
MR39A	24	4	tons/yr	4.9	tons/yr	3.2	tons/yr
MR39B	24	4	tons/yr	4.9	tons/yr	3.2	tons/yr
N40B	16	3	tons/yr	5	tons/yr	1.5	tons/yr
Nov58A	19	5	tons/yr	5.8	tons/yr	2.5	tons/yr
MN61A	17	5	tons/yr	5.8	tons/yr	4.3	tons/yr
MN61B	16	5	tons/yr	15	tons/yr	4.3	tons/yr
MN61C	16	5	tons/yr	8.9	tons/yr	2.7	tons/yr
MN61D	33	5	tons/yr	8.9	tons/yr	2.7	tons/yr
C66	20	5	tons/yr	9.9	tons/yr	3.6	tons/yr
C67	17	5	tons/yr	16	tons/yr	4.5	tons/yr
C69	7	5	tons/yr	12	tons/yr	3.3	tons/yr
Total:	**464**	**acres**					

Walnutdale Farms uses minimum tillage, including chisel plow followed by a drag or finisher on most fields. If fields become compacted due to harvesting when soils are wet or from excessive traffic a deep ripper is used to improve soil structure. No till is also used when conditions allow. Minimum tillage practices increase the amount of residue left on the ground surface, thereby decreasing the rate of soil erosion by sheet runoff.

Fields with estimated rates of soil erosion exceeding the tolerable limit will have mitigating strategies applied to them to reduce the potential for soil movement offsite by water erosion. A detailed analysis for all field can be found in appendix six, this section also contains possible solutions that will bring the estimated rate of soil erosion below the tolerable limit (done by using high residue crops, no till and manure applications).

Wind Erosion:

Wind erosion is one way that nutrients move offsite from the field into surface waters. The offsite movement of soil particle can carry nutrients and chemicals into these surface waters. The NRCS has developed an equation that helps estimate the rate of soil loss due to wind erosion on specific soil types. The factors for this equation include the distance that wind travels without any windbreaks, the surface residue, the tillage practice and the specific soil types.

Soil types are classified based on their tendency to be transported by wind erosion. The classification number is called the "I" value. Soils that have an I value exceeding 86 have been evaluated and the worksheets are included for each field in appendix eight.

Table 4. ***Wind Erosion Equation Results***

WEQ Data based on Current Crop Plan					
Field ID	Acres	Tolerable limit		Est. Rate	
T-43	13	4	tons/yr	4	Tons/yr
T-44	14	4	tons/yr	4	Tons/yr
Nov-58A	19	4	tons/yr	4	Tons/yr

Nov-58B	17	4	tons/yr	4	Tons/yr
17-5	18	3	tons/yr	5.5	Tons/yr
17-6	18	3	tons/yr	6.5	Tons/yr

Solutions that will be implemented on the fields that have an estimated rate of soil erosion exceeding the tolerable limit are seeding to alfalfa, reducing the tillage practices on these fields, adding wheat or other small grain crops that leave large amounts of residue in the fields. Other options include planting cover crops, seeding grass strips or tree lines to create wind breaks.

Winter Spreading:
Winter manure applications at Walnutdale Dairy are from pen-packed manure from the fresh cow barn and the steam up group. These groups are bedded with a straw or sawdust pack. Manure is cleaned and hauled to the fields in manure spreaders for direct land application when conditions are appropriate or are stockpiled in the fields until the conditions allow application to take place. When manure is stockpiled in the field dirt is bermed against it to prevent any run-off. Dry manure is land applied to fields that have slopes less than six percent during the winter.

Winter spreading criteria is based on the Manure Application Risk Index (MARI) calculations as well as field evaluations and observations of water movement and flow from the fields. Walnutdale has 82 acres that have been evaluated and determined to be appropriate for winter application of manure based on slope, water flow, and surface water setbacks. The 82 acres have a MARI index of medium but water on these fields ponds and does not move offsite. Below are the fields that are suitable for winter application of manure.

Table 5. ***Fields Available for Winter Application***

Fields Available for Winter Applications		
Field ID	**Area**	
W-22B	12	acres
J-52 A&B	38	acres
17-4&5	32	acres
Total:	**82**	**acres**

Water Quality Related: Sensitive areas for manure application are noted on color coded maps and are included in this plan in appendix two. Manure application maps and application log forms will be provided to all operators applying manure. Setbacks are noted for waterways, open tile inlets/outlets, areas of unacceptable slope, wells and close proximity to residences. Proper manure application following the setbacks will minimize the risk of offsite nutrient flow.

Water Supply: Wells located at this facility are identified on the site map in appendix one. All wells are located to the west of the cattle barns at acceptable distances from the

manure storage structure and production facilities. Well isolation distance worksheets and copies of the well logs are located in appendix nine.

Land Application Management

Land Requirement:
Using the mass balance method of feed analysis and nutrient uptake, removal of nutrients in calves and milk production, the predicted phosphorus production in the form of manure is estimated at 124,796 lbs of P2O5 per year. The average crop removal for the land base managed by Walnutdale Dairy is 63.6lbs/acre of P2O5 per year. Using this removal number, in order to be a sustainable operation based on phosphorus utilization, the facility would need 1,962 acres. Walnutdale currently managed 1,857.1 acres for its dairy operation. Current soil tests show that 1,794.1 acres available for manure application (under 300lbs/acre). Calculations showing the phosphorus production and utilization can be found in appendix four.

Walnutdale is currently 104.9 acres short of having their phosphorus production equal to their phosphorus utilization. Walnutdale has worked with crop producers in the area for several years by supplying nutrients in the form of manure. Annually over one million gallons of manure have been utilized by area producers over the last several years. When manure is transferred offsite Walnutdale retains the appropriate documents and forms. This documentation includes s signed copy of the manifest form, a soil test showing that the field may receive manure applications and the planned crop that the manure is being applied for.

Walnutdale has an agreement with County Line Dairy in Caledonia to apply manure for crop production on County Line's fields. This is a small dairy that has a large land base that will benefit from manure applications. Maps of these fields and soil tests are included in appendix five. Records of manure applications for this farm will be retained with all other offsite utilization of nutrients.

Manure:
Prior to manure application the manure in the storage structures is agitated and then pumped into the application equipment. Manure applications are performed by Walnutdale's employees who have been trained. Application is done using one of the pieces of equipment found on page four. Manure is injected when possible and the manure that is surface applied is incorporated with the exception of applications on alfalfa.

Manure will only be applied on land with phosphorus levels that are below 300lbs/acre and will be applied at agronomic rates based on soil tests and planned crops. A chart has been provided in appendix four that shows the current nutrient content in the manure (based on a manure test) and the recommended rate of application based on P removal, and nitrogen recommendations (depending on timing, crop plan and yield goals).

Manure analyses are included in this plan (appendix four) and are taken annually. These samples are taken during manure application; this ensures representative samples are taken that reflect the manure being applied.

Soil Sampling:
Nutrient management for crop production is based on current soil tests. Soil testing occurs every three years for each field. The samples have been taken to represent approximately 20 acres or smaller and are taken at a depth of 8-10" (the tillage depth). Fields that have sample zones larger than 20 acres have been farmed and managed the same for many years. Composite samples have been taken according to MSU guidelines and are done in a zigzag pattern across the field.

GPS sampling has also been used by Walnutdale for more specific fertility management. Fields that have been sampled using gps were done using 2.5 acre grids.

Results from all soil sampling can be found in appendix three. A soil test report summary lists the fields and soil tests results in lbs/acre (KISS form). Following the summary are the GPS maps showing phosphorus levels for fields that have been grid sampled.

Nutrient Budget:
Crop nutrient removal is an essential part of managing manure produced at Walnutdale Dairy. As stated before phosphorus production is estimated at 124,796 lbs per year and the phosphorus removal of crops grown by Walnutdale is estimated at 118,140 lbs per year. The following table shows the crop nutrient removal for Walnutdale based on the 2008 crop plan.

Table 6. ***Crop Nutrient Removal Rates.*** *The yields below reflect achievable yields on different fields. Soil types and past yields are used to determine yield goals.*

Crop Nutrient Removal

Uptake:

Crop	2008 Acres	Yield Goal Per Acre (tons/bushel)	Estimated Crop Nutrient Removal (using GAAMPs values below)		
			Total N (lb)	P_2O_5 (lb)	K_2O (lb)
Corn-silage (tons)	287	23	62,049	21,783	52,808
Corn-silage (tons)	739	16	111,146	39,019	94,592
Corn-grain (bu)	80.5	130	9,419	3,872	2,826
Alfalfa (tons)	40	3	5,400	1,560	5,400
Alfalfa (tons)	139	4	25,020	7,228	25,020
Alfalfa (tons)	88	5	19,800	5,720	19,800
Alfalfa (tons)	312	6	84,240	24,336	84,240
Alfalfa (tons)	81.6	7	25,704	7,426	25,704
Wheat-grain (bu)	130	80	12,480	6,552	3,848
Wheat-straw (tons)	130	1.5	2,535	644	4,485
Soybeans (bu)		40	0	0	0

	Totals:	**357,793**	**118,140**	**318,723**

Dairy Facility **1857.1** **63.615** **lbs/acre**

From Manure Mgmt. GAAMPs, 2004, pg.28

Pounds of Nutrient Removed per Unit:

Crop	Unit	Avail-N	P_2O_5	K_2O
Corn-silage	tons	9.4	3.3	8
Corn-grain	bu	0.9	0.37	0.27
Alfalfa	tons	45	13	45
Wheat-grain	bu	1.2	0.63	0.37
Wheat-straw	tons	13	3.3	23
Soybeans	bu	3.8	0.8	1.4

Manure applications are made based on manure nutrient content, soil test results, past crops, planned crops, management practices and yield goals. A detailed plan describing nutrients applied in the form of manure can be found in appendix four. This plan has been generated using the Purdue Manure Management Planner program.

Nitrogen Leaching:

Nitrogen leaching risk indexes are based soil types and the likelihood that the nitrogen will move downward through the soil and out of the root zone. This avenue for offsite nutrient movement is one that will be minimized by proper nutrient management and nitrogen utilization. The nitrogen leaching risk indexes show that Walnutdale manages ground that has 278 acres in the high risk category, 1,599 acres in the medium risk category and 18 acres in the low category.

Manure application done in accordance with the established setbacks concerning surface waters, tile inlets/outlets, wells and nearby residences will minimize the risk of nitrogen movement into sensitive areas. Timely incorporation and spreading when there is no forecasted significant precipitation events will also help reduce these risks.

Nitrogen management in crop production is very important and has significant impacts on yields and production costs. The availability of nitrogen from manure is a very important asset to Walnutdale. Corn production is being managed to minimize the amount of nitrogen applied without reducing the yield potential of the crop.

Manure applications are done prior to planting, when the previous crops have been removed. At planting Walnutdale uses a 28% base starter fertilizer and a pop-up fertilizer containing approximately thirty pounds of nitrogen. Ground that has not received manure for several years is managed using commercial nitrogen in the form of urea and a slow release nitrogen product that helps reduce the chance of nitrogen leaching and increase the uptake of N by the corn plant. Ground receiving manure applications are sampled using the Pre-side dress nitrogen testing process. The PSNT tests are analyzed and applications are made according to yield goals and available nitrogen in the soil from the previous crops and manure applications. Using the management practices listed above Walnutdale reduces the amount of nitrogen applied to fields and reduces the risk of leaching.

Phosphorus Loading:
Soils that are naturally high in phosphorus or have had heavy phosphorus loading (in the form of manure applications or from over applications of commercial fertilizers) many not have the capacity to attach additional phosphorus. Applying phosphorus to these soils may result in unattached phosphorus in the soil and the potential for offsite movement of this phosphorus. This soluble phosphorus is mobile and measures of control may need to be considered to reduce the potential for offsite movement.

Proper management of manure application will prevent phosphorus loading from occurring and reduce the likelihood of this offsite movement. Manure will be applied at agronomic rates depending on the management practices outlined in the nutrient budget.

Fields that have soil tests that are below 150lbs/acre can receive manure applications based on the nitrogen requirements of the planned crop.

Fields that have phosphorus levels between 150 and 300lbs may receive manure applications at one year of phosphorus removal (or two years removal but appropriate records must be maintained and not application made the following year, i.e. a corn/soybean rotation). A chart showing the manure source, planned crop and yield goal has been provided in appendix four that shows the rate of manure for each source and yield goals.

Phosphorus Reduction:
Soils that have phosphorus levels that are over 300lbs/acre cannot receive manure applications. Walnutdale manages fields that have soil tests that exceed 300lbs per acre. These fields have been identified and will not receive manure (these are fields that are identified with red highlights on the application maps). These fields should be managed in a way to bring the nutrient level down. This will be accomplished by preventing further application of phosphorus on the field and by increasing the rate of nutrient removal in the form of harvested crops. The drawdown process is greater with increased yields and tonnage removal through intensive cropping and high yields but is a very slow process. Even with intense cropping plans, the soil test levels fall very slowly, the best way to deal with overloaded soils is to prevent them from reaching 300lbs/acre initially by using proper management.

Record of CNMP Implementation

Records will be kept by (b) (6) (b) (6) at the main farm, which is located at 4309 – 14th St. Wayland, Michigan 49348. Records will be retained in files and also submitted annually to the MDEQ in accordance with the NPDES permit issued to this facility. Annual summary of the data will be stored on computer as well as files. These records will be retained for five years and will include:

- Maps of fields

- Soil test reports
- Manure Volume Produced
- Manure nutrient analysis results
- Record of manure sold or given away with manifest forms ant the associated records needed for offsite transfers of manure
- Dates of manure application
- Source and Rate of manure application
- Dates and rates of other nutrients applied
- Dates of incorporation
- Method of application
- Area of field application
- Weather conditions 24 hours before, during and after the application of manure
- Field conditions during applications of manure
- Recommended nutrient application rates
- Previous crops and yields in addition to current crops
- Plant tissue sampling and test results (when applicable)
- Pre-side dress nitrate test reports (when applicable)
- Inspection and maintenance records for application equipment
- Inspection logs for manure storage structure in accordance with the NPDES permits issued to the facility

Inspections, Operations & Maintenance, Training

Included in this CNMP is a sample log sheet used to record the manure applications. Operators log each load they haul, the manure source, the type of spreader, field conditions, wind direction and the date with initials from the operator applying the manure. This form can be found in appendix five.

Inspections of all manure handling equipment will be done by the manure applicator before transport.

The structural integrity of each storage facility will be inspected by (b) (6) or (b) (6) (b) (6) or a trained employee. Storage inspections will be done weekly. A checklist has been provided in appendix five that will be recorded and submitted annually showing inspection of the structure and the monitoring of freeboard levels are being completed. Any issues with storage structures will be addressed as soon as possible in the appropriate manner.

All employees will be trained upon hire in the areas of manure spreading, equipment handling and operation, as well as equipment maintenance and calibration. Also, all new hires will be trained to apply manure according to the setbacks identified on the application maps avoiding sensitive areas.

Spreader Calibrations:

Manure application equipment has been calibrated by determining the capacity of the application equipment (gallons or weight) and measuring the area that was covered when the manure was applied. Charts showing the area and volume applied can be found in appendix nine.

-John Deere Hydro-Push: this spreader was determined to apply manure at a rate of seven tons/acre. This spreader has the capability of changing the rate manure is unloaded at. A chart in appendix nine shows how tractor speeds change the application rate based on a constant unload rate from the spreader itself. This chart also shows the rate of phosphorus applied.

-Knight 830 Side Slinger (Liquid/Solid): This spreader can apply liquid or dry manure. Walnutdale uses this spreader mainly as a semi-solid manure. Application was measured at a rate of 3,243 gallons/acre. This spreader also has the capacity for changing application rates by opening the door. A chart is included in appendix nine that shows application rates when the tractor speed is varied. Phosphorus rates are also included for manure sources.

-Houle 7300 Liquid Tank (direct inject): This 7,300 gallon manure applicator is equipped with an injector bar and was calibrated at a rate of 11,622 gallons/acre. Application rate can be adjusted by changing the speed of the tractor. Manure volume and nutrient rates can be found on the charts located in appendix nine.

-Houle 7300 Liquid Tank (surface apply): This 7,300 gallon manure applicator applied manure at a rate of 4,877 gallons/acre. Spreading rates with this tank can also be varied by speed. Application charts in appendix nine show the application rates vs. speed.

-Semi Tankers: Manure is transferred to the fields using these 9,000 gallon tanks and is applied using these tanks when conditions allow. These tankers are equipped with splash plates and have been measured at 6,670 gallons/acre when passes are overlapped and 3,400 gallons/acre when passes are not overlapped. Application charts can be found in appendix nine for these tankers.

-Meyer 7200 Dry: This spreader is used primarily for dry manure application and has a capacity of approx 2.5 tons (depending on manure density). The Meyer spreader has been calibrated at a rate of five tons/acre. Application charts can be found in appendix nine.

Schedule of Implementation

This Comprehensive Nutrient Management Plan will be implemented July 1, 2008 and updated annually based on manure tests, soil tests and crop plan. Any changes greater than 10% in livestock or land base will merit a revision and recertification of this CNMP.

Items requiring implementation:

- The air pockets in the catch basin have presented challenges and are continually being worked on or repaired. This monitoring and venting of the air pockets will continue. Self venting tubes are being installed and monitored for effectiveness.
- Leachate from the haylage pad will be collected and clean water will be diverted using bumpers and diversion boards accordingly. Designs for this are being developed currently by CJD Consulting and will be constructed by July, 2009.
- Manure Application equipment will be re-calibrated when fall harvest of crops begins.

Emergency Action Plan

Anticipated flow paths are shown on the site map for this location. In the event of a spill, it is required that the flow of nutrients be stopped as soon as possible to prevent them from reaching surface waters.

Runoff from the farm is collected in the catch basin thereby reducing the risk for offsite manure flow.

In the event of a spill, material would follow the runoff flow identified on the site map and the overview map. Spills or overflows of storage structures must be stopped as soon as possible to prevent nutrients from reaching surface waters.

Breach of Manure Storage:

1. Attempt to dam or berm any spill from entering surface water.
2. Pump manure from storage and transfer it to another storage structure or land apply it at agronomic rates if possible.
3. Remove manure from the discharge area.
4. Contact (b) (6) or (b) (6) (b) (6)
5. Call the MDEQ Pollution Alert System at 1-800-292-4706.
6. In the event that a county drain or creek is affected, contact the Allegan County Drain Commissioner at 1-269-673-0440.
7. Record any uncontrolled discharge or wastewater that warranted emergency action response to the MDEQ Water Quality Division.

Manure Spill on Roadways:

1. Stop any additional spill.
2. Build a containment dam and remove manure.
3. Contact (b) (6) or (b) (6) (b) (6)
4. Contact the local road commission and drain commissioner.
5. Contact the county sheriff.
6. Wash manure off the road under advisement.
7. Call the MDEQ Pollution Alert System at 1-800-292-4706.

Manure Spill in Fields:

1. Stop manure application.
2. Build containment dams.

3. Contact [redacted] or [redacted]
4. Collect manure and apply at agronomic rates.

Runoff of manure from Field:

1. Stop manure application.
2. Plow a diversion trench to prevent offsite movement.
3. Contact [redacted] or [redacted]
4. Remove manure and land apply at agronomic rates.

Manure spill while loading from storage structures:

1. Turn off loading or agitation equipment.
2. Collect manure and pump it into storage or application equipment.
3. Contact [redacted] or [redacted]

Notes:

- In the event that a county drain or creek is affected, call the Allegan County Drain Commissioner at 1-269-673-0440.
- Record and report any uncontrolled discharge of wastewater that warranted emergency response to MDEQ Water Quality Division.
- Leaking or malfunctioning equipment should be kept away from ditches, streams and all channels to surface waters. Equipment not operating as designed should be taken out of service immediately and repaired before further use.
- Record all spills.

Emergency Numbers

[redacted] [redacted] [redacted]

MDEQ Pollution Alert System	**1-800-292-4706**
MDEQ Kalamazoo Office	**1-269-567-3500**
MDEQ Grand Rapids Office	**1-616-356-0500**
Allegan County Drain Commissioner	**1-269-673-0440**

References:

- Midwest Plan Services – 18 Section 1 “Manure Characteristics”
- Generally Accepted Agricultural Management Practices for Manure Management and Utilization, MDA March, 2008.
- MSU Extension – Crop Advisory Team Alert, “Winter Spreading: Keeping Manure Nutrients in the Field and Out of Surface Waters,” October, 2003
- Manure Management Systems Program Developed by Purdue University
- RUSLE2, NRCS Program

Appendices:

1. Appendix One
   - Site map
   - Overview Map with photo.
2. Appendix Two
   - Application Maps
   - Soil Survey maps
3. Appendix Three
   - Soil Test Summary (KISS sheet)
   - GPS Soil Test Maps
   - Crop Plan for 2008
   - Nutrient Balance Sheet – Crop plan and fertility reccomendations
4. Appendix Four
   - Manure Test Results
   - Mass Balance Documents
   - Crop Removal vs. Phosphorus Production sheet
   - Manure Calendar and Plan
   - Manure Rates vs. Planned Crops Sheets (phosphorus and nitrogen)
5. Appendix Five
   - Manure Application Logs
   - Manure Storage Inspection Logs
   - Manure Equipment Evaluations
   - Mortality Records Form
   - Manifest Form
   - Manure Sale Log
   - County Line Farms ([redacted] Farms) Maps and Soil Test Results
6. Appendix Six
   - RUSLE2 Evaluations and alternate crop plans
7. Appendix Seven
   - MARI Evaluations
8. Appendix Eight
   - Wind Erosion Equation Results
9. Appendix Nine
   - Pit Evaluation letters
   - Storage calculations for manure storage structures
   - Spreader Calibration Forms
   - Well Isolation Documents and Well Logs